Rohan Panicker

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EDUCATION

University of Washington, Seattle   September 2023 - June 2025
- Master of Science in Mechanical Engineering with concentration in Robotics, Controls and Artificial Intelligence.
- **Coursework**: Artificial Intelligence, Control Theory, Deep Learning.

MIT World Peace University, India   July 2017 - July 2021
- B.Tech in Mechanical Engineering.
- **Coursework**: Mechatronics, Matlab/Python, Kinematics and Dynamics, Data-Structures and Algorithms.

SKILLS

- Programming Languages :   Python, Rust, C, C++, Matlab and Simulink, CUDA.
- Libraries and Frameworks: ROS, ROS2, Numpy, SciPy, flask, OpenCV, Pytorch, QT, GStreamer, Pandas, Isaac Gym, PyBullet.
- Software development tools: Git, Jira, Docker, Kubernetes, CMake.
- Embedded Systems: Raspberry Pi, NVIDIA Jetson, STM32F4 series, NXP LPC5500 series, ODROID XU4.
- Technical Skills :   Signal Processing, Statistical Modelling, Cluster Analysis, Data Analysis and Visualization

WORK EXPERIENCE

Graduate Student Researcher   **Robotics Learning Lab**   September 2023 - Present
- **Accepted** paper for the **ICRA 2024** workshop on dynamics learning for off-road autonomy.
- Reduced roll-over likelihood by **10%** on UW Racer off-road autonomous vehicle simulator by using Deep Reinforcement Learning.
- Created a data pipeline for visualization and offline learning using C++ ROS wrappers for the A1 quadruped.
- Implemented model-free reinforcement learning algorithms for quadrupeds and wheeled robots using Isaac Gym simulator.

Embedded Software Engineer   **TATA Advanced Systems Limited (TASL)**   June 2022 - July 2023
- Used model predictive control after deploying YOLOv8 for object detection and tracking, reducing object tracking latency by **65%.**
- Solved object occlusion tracking problem by using a bayesian filter and a PID controller, improving accuracy by **13%.**
- Actively led system and sensor selection for project RAJAK, **saving $2000** by eliminating expensive third party solutions.
- Boosted gimbal stabilization accuracy by **80%** using Kalman filter-based sensor fusion between optical flow data and IMU values.
- Designed a UDP client-server API on a NXP board for real-time data acqusition of a long range observer system.
- Implemented an end to end perception pipeline for Thermal Imaging and LiDAR using OpenCV and GStreamer.

Control Systems and Perception Engineer   **Research and Development Establishment Engineers lab**   July 2021 - February 2022
- Created a dataset using Motion Capture of human gait locomotion for designing a control system of a lower limb exoskeleton.
- Integrated fuzzy logic for gait switching into a Raspberry Pi for motor-controlled gait assistance, during walking and stooping.
- Led a team of four in developing a **budget-friendly adjustable ankle exoskeleton** that reduces energy expenditure by **17%.**

PROJECTS

- **Failure Prevention using Reinforcement Learning for Quadruped Locomotion**
  - Collected real-time and simulated quadruped failure data, applying domain randomization to create a diverse failure dataset.
  - Implemented PPO algorithm to sample actions by training an LSTM neural net on failure data in ISAAC Gym.
- **3D Mapping for indoor autonomous navigation**
  - Improved 3D point cloud mapping **speed by 25%** by merging the NDT and ICP point cloud registration algorithm with EKF.
  - Fixed the temporal data mismatch from the 2D-LiDAR and inertial odometry by using error propagation using prior covariance.
  - Presented my research at ICIIET **IEEE** conference 2023.
- **TinyML and Object detection and tracking using STM32**
  - Utilized STM32 X-Cube-AI for image processing using the OV7670 camera on a pan-tilt setup, controlled by STM32.
  - Trained a CNN to detect a moving object and track it by converting sparse optical flow to velocity commands for the motors.
  - Used CIFAR-10 dataset for image classification on a STM32F429 using the X-Cube-AI library, achieving **78% accuracy** at **25 FPS.**

PUBLICATIONS

- Rohan Panicker . Sensor fusion between IMU and 2D LiDAR Odometry based on NDT-ICP algorithm for Real-Time Indoor 3D Mapping. *TechRxiv.* July 25, 2023.
- Tripathy, Shivam & Panicker, Rohan & Shrey, Shubh & Naik, Rutvik & Pachpore, Swanand. (2020). Voice Controlled Upper Body Exoskeleton: A Development For Industrial Application.

ACHIEVEMENTS

- Received a **Spot Award** from TASL in acknowledgment of contributions to software development for Project RAJAK.
- **Silver Medalist** at the Nanotechnology, Sciences and Application course held by IIT Madras in 2020.
- Achieved **3rd rank in Asia** in the SpaceX Hyperloop Pod Competition at the preliminary round 2018.